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The sustaining members of this organization are milling companies and other organizations which have the interest of the cereal chemist and cereal chemistry at heart and wish to give them financial aid.

To increase the knowledge in cereal chemistry and to establish uniform methods of procedure and control of value to their employer.

Any information in regard to sustaining membership may be obtained from the secretary, Mr. A. A. Jones, The Larabee Flour Mills Corporation, Hutchinson, Kansas.

The sustaining member has all the rights of a member except the vote.

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FEB-3 '22

ANNOUNCEMENT

To the Members of the

American Association of Cereal Chemists

We take pleasure in announcing that we have another booster. He is none other than Mr. Newton C. Evans, Editor of the NATIONAL MILLER.

Recently we have had considerable correspondence with Mr. Evans and arrangements have been made whereby this Association will answer all technical questions relating to Cereal Chemistry or to any phase of the work that relates to milling. These questions must be short and to the point.

In every case where question has been answered credit will be given to the individual member and also to the Association. In one of his letters Mr. Evans says, "I shall do my best to bring out questions from millers for cereal chemists to use and hope that we will soon have enough to run a regular cereal chemistry department." NOW, cannot we do our best to answer these questions and show Mr. Evans that we are with him and the milling world at large that we are on the job. I myself, and every one of you, hope that there will soon be enough interest shown in this line so that we may start that department of cereal chemistry for the National Miller.

This is along the line that you requested last June at the Convention. Now that you have it what are you going to do with it? Keep it going of course We, at present, have two members of this Association on the Advisory board of the National Miller. You cannot set back and let them do all of the work. Mr. Evans will send all questions to the President of the Association who will send them to the one he thinks best fitted to answer. When you get a request for an answer it must take precedence over all other work and be answered at once. And send your answer to Box No. 82, New Ulm, Minn.

It is hoped that similiar arrangements can be made with other milling journals but for the present you must put your shoulder to this wheel and see that it turns.

Yours very truly,

S. J. LAWELLIN, President

Where Are Those Journals?

At the Convention last June you were requested to look over all of your back numbers of the Journal of this Association and see if you did not have extra copies or copies that you did not want. You were also requested to send those extra copies to the President. Several of those present said that they had extra copies and would send them in but to date Shultz has been the only member to remember this small request. Where are your extra copies?

We frequently receive requests for back numbers and also wish to replenish the files of the Association. Please look ofter this matter and if you have extra copies or do not wish to keep all of your copies send them to Box No. 82, New Ulm, Minn.

Yours very truly,

S. J. LAWELLIN, Pres.

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THE JOURNAL

OF THE

AMERICAN ASSOCIATION

OF

CEREAL CHEMISTS

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A CRITICISM

S. J. Lawellin

One of the most peculiar, worthless, and contradictory articles that has ever come to our attention, appeared in the Northwestern Miller under date of August 24th, 1921. The article in question is credited to John C. Summers under the title "The Science of Baking. VI: Experimental vs. Commercial Baking."

It is quite evident that the main purpose of the article is only to cause prejudice against experimental baking in general and cereal chemists in particular. The asinine statements made clearly shows a lack of knowledge of the situation both as regards the person carrying on experimental baking and the actual conditions of an experimental bakeshop. The statements are so modified and twisted as to give the reader a vague and prejudiced idea of experimental baking, its methods and interpreted results.

In his opening paragraph he tries to convey to the reader that experimental baking is generally improperly done and that no value is obtained by results. For instance, he says: "If properly done, experimental baking, or test baking in the laboratory, furnishes much valuable information concerning flours and other raw materials," and then goes on to say; "But as this work is often done, little value can be placed upon the results obtained therefrom.

In his paragraph entitled "Workmen" he launches a boomerang in this manner: "It is often the case that this very important work is entrusted to chemists or laboratory helpers who are void of both knowledge and experience in commercial baking. Such persons are incapable in many instances of conducting the work and making deductions that are of real value to miller or baker." Also he is very positive that, "Very often, too, they use ridiculous formulas, methods and equipment in doing this work." Now wouldn't that make you hestitate? But note how well the statements are modified and given a double meaning.

Under formulas comes his first direct statement. He says, in speaking of experimental formulas; "They contain entirely too great percentages of yeast, sugar, shortening or other ingredients." The actual facts in the case, however, knock this statement into a cocked hat. This remark should surely have been modified, also, as it plainly shows Mr. Summer's lack of information in the

very field in which he purports to be an expert.

Under equipment and methods his flowery contradictory style continues. Observe the following: "In addition to having good balances, thermometers and containers ********." Perhaps the average chemist wouldn't know a good balance or thermometer if he saw one. And we will wager that the so called balances Mr. Summers refers to are the kind generally listed as "scales." And this array of modified and incorrect statements continues throughout the article.

Why does not Mr. Summers get down to facts and say something specific? Perhaps it is on account of being, "void of both knowledge and experience" in experimental baking. Give us, for instance, his formula for experimental baking, his methods, manner of handling, size of pans and kind of equipment for correct experimental baking. There is no question in our mind but that such an article would be so full of absurdities as to really be classed under "Grist or Grins."

Why howl for specific formulas and standard loaves, in experimental baking, that would parallel commercial baking methods when, in fact, commercial formulas and methods are as vared and changeable as the winds? Everyone acquainted with the facts knows that commercial formulas, methods and size of pans vary immensely. Commercial bakers actually use from 1% to 4% yeast, from 2% to 5% sugar, from 2% to 4% shortening, from 2 to 8 hours fermentation, some use malt, milk and bread improvers while others do not. They make double loaves, split loaves and single loaves. One baker will use a slightly shorter or narrower pan in order to make his loaf higher thus giving it the appearance of a lighter or better raised loaf. Mr. Summers is evidently of the opinion that two pounds of dough will ferment the same, develop the same amount of heat and acidity as eight hundred pounds of dough. Also that an oven holding ten loaves will perform the same as one holding four hundred. Our experience as practical baker, experimental baker and chemist has taught us that Mr. Summers is shooting wide of the mark.

There are a few statements in Mr. Summers' article that have real merit when taken alone. But when taken in the connection with which they are used they are lost in the absurdities of the article. It is to be regretted that such an article should be given space for publication. The only thing that can be said of the article is that it fills three columns of space that might otherwise remain blank. The reading of the article brings to our mind the slang expression, "It is to laugh."

NOTES ON BREAD TROUBLES

S. J. Lawellin.

ROPE

Bacteriological investigations of bread indicate that rope in bread is caused by varieties of Bacillus Mesentericus and Bacillus Viscosus. Rope is most prevalent in wheat bread and this is undoubtedly on account of the favorable conditions in wheat bread for the growth of these organisms. Rye and barley breads have an acidity sufficiently high to greatly retard or even prevent the growth of the organisms causing rope. The growth of the B. Mesentericus cannot take place at a greater hydrogen ion concentration than 10^{-5} N.

Rope may be prevented in bread by the addition of lactic acid or the use of vinegar. When using vinegar

two tablespoonfuls for each barrel of flour will effectually prevent rope. Lactic acid, however, is recommended and the best proportion is to use about one and one half ounces U. S. P. lactic acid to each barrel of flour which will be sufficient to prevent rope.

A simple method of measuring the hydrogen ion concentration of bread is to add to the freshly cut surface, of the bread, a few drops of the ordinary methyl red solution, of a strength of 0.02%, in 60% alcohol. When the hydrogen ion concentration is sufficiently high to prevent rope the methyl red will appear as a full red at the end of five minutes. If an orange color has remained sufficient acid has not been added and greater amounts should be added to the succeeding batches of dugh until the test gives just the desired red. The amount of acid necessary will depend largely upon method of baking and acidity of natural flour and other ingredients.

ERGOT

Ergot, *claviceps purpurea,* is a fungous growth affecting wheat and rye, and contains a poisonous alkaloid. It is often found on rye but less frequently on wheat. Under the microscope it appears as a fine network of parenchyma cells that are generally colorless and contain globules of fat. Some of the cells are circular and others quite elongated.

A few of the cells contain a deep brown coloring matter which becomes violet red with ammonia and changes to red with acid. Occasionally the cell walls appear of a dark color. Two methods are recognized as giving positive tests for ergot. The microscopic test is to treat the flour with a very dilute solution of aniline violet and examine under the microscope. The damaged cells of the grain will be found to have absorbed practically all of the aniline violet which is resisted by the normal granules.

The qualitative test is made by extraction of the flour with hot alcohol. To the hot extract is added dilute sulphuric acid, when the solution is colored red if ergot is present. Ergot contamination in wheat flour rarely occurs but will be found at times in the spring wheat area. It is quite common in rye flour though the percentage of alkaloid is so very small as to give the flour or bread no toxicity at all. The main objection being the unpleasant taste in rye bread where very little wheat flour is added.

VETCH

The seeds of the vetches, when ground up in flour, gives a very rank and disagreeable odor to bread. This odor is noticeable only after enzymetic action has taken place. It also imparts a very bitter taste to the bread. This odor and taste is caused by the benzaldehyde or "oil of bitter almonds" which is obtained from the glucoside amygdalin, occuring in vetch and bitter almonds. Amygdalin, in contact with water, is gradually decomposed by the enzyme, emulsion, into benzaldehyde, hydrogen cyanide, and glucose.

The odor given off from the hot bread or aqueous extraction of the flour is sufficient to identify the benzaldehyde odor. To test chemically an aqueous extract should be made by treating the flour with water in the proportion of 1:10, the extract is decanted into distilling flask, a few cubic centimeters distilled over, and to this solution any of the well known tests for benzaldehyde may be applied.

Vetch is quite common in spring wheat and is one of the hardest weed seeds to remove. The common tame variety, *vicia villosa,* and the wild vetch, *astragalus canadensis lucerne,*

both cause this trouble when ground up in flour.

RHINANTHIN

When the ground seeds of *Rhinanthus alectorolophus* and *Melampyrum* are contained in flour they impart a very peculiar color to the baked bread. This color varies from a light to a medium blue depending upon the concentration of the ground seeds. The color is due to the liberation of rhinanthin by acids. The acidity of the dough is sufficient to liberate this compound from the ground seeds. Rhinanthus is a small root-parasitic herb having winged seeds. Melampyrum is a small hemiparasitic plant. Cow-wheat is the common name for *melampyrum americanum.* This color developed by rhinanthin is quite diffenent from that caused by stencil paste as it is generally uniform throughout the bread and does not have the heavy purplish tinge given by stencil paste.

To test for rhinanthin one or two grams of flour are treated with from 10 to 25 cubic centimeters of 70% alcohol containing a few drops of dilute hydrochloric acid. The solution is filtered and the filtrate heated almost to boiling when a blue or greenish-blue color will develop if rhinanthin is present. Upon making the solution slightly alkaline, with dilute potassium hydroxide solution, the blue color changes to an orange red or red-brown depending upon the amount of rhinanthin present. Vogl's alcoholic HCl mixture may be used in extracting the rhinanthin. This consists of a few drops of 5% HCl solution to 10 cc. 70% alcohol.

CLOVERS

The seeds of the clovers, when ground up in flour, give a very decided odor to the flour and bread. The odor is that of cumerene and is very slightly noticeable in the dry flour, but after enzymetic action in the dough becomes quite plain. It is the sweet odor of clover. This is true of all the clovers of the family *Trifolium, comprising the genii Arvense lucerne, hybridium L., pratense L., incarnatum L., procumbens L., agrarium L., and repens L.*

The members of the family *melilotus* apparently do not give the same odor but this is an open question. Tests for cumerene on their extracts are not positive. The family *melilotus* comprises the sweet clovers while the family *trifolium* comprises the true clovers of the sub-class lucerne.

RED SPOTS

Red spots in bread are caused by *Micrococcus prodigiosus.* After being cut and exposed to air for a few hours, bread inoculated with *M. prodigiosus* will begin to ferment and red spots will appear at culture centers. This fermentation takes place only in bread of high acidity. *M. prodigiosus* requires acid media when in agar-agar culture.

PURPLE AND RED SPOTS

Purple spots, and sometimes red spots, are often caused from carelessness in the packing room. They are caused by careless handling of stencil paste which often gets into the flour. Small specks of this paste are scarcely noticeable in the dry flour but when made up into dough and given a chance to spread cause quite noticeable spots in the bread. These spots are markedly different from those caused by *M. prodigiosus* as there is no evidence of spore formation and the spot looks very much like an ink stain.

With stencil paste the spots are at once noticeable upon cutting the bread while warm but *M. prodigiosus* develops only after the cut surface has been exposed to air, a sufficient length of time to induce growth of the organisms. However, *M. prodigiosus* may develop in uncut loaves but only after several days.

Note: The use of indelible pencils in mill is liable to cause purple spots in bread and should be forbidden.—Editor.

PREPARATION OF STANDARD SOLUTIONS

S. J. Lawellin.

It has usually been the custom to prepare standard solutions of acids and alkalies by first measuring or weighing the ditilled water. When large carboys of solutions are made up it is rather a tedious and sloppy job to accurately measure the amount of water used. Then when the water is weighed it requires a pair of heavy duty scales, not overly accurate, which many laboratories do not contain.

When making up a carboy of solution we merely fill the container to the desired height and then estimate, actually guess at, the amount of distilled water we have run off into our carboy. And this is about the only "guessing" we would recommend for a laboratory.

Suppose we wanted to make up a carboy of N-10 sulphuric acid. Say our estimation of the amount of distilled water was 14 liters. One liter of N-10 acid should contain 9.8076 grams of sulphuric acid and 14 liters would then contain 137.31 grams or 74.623 cc. if acid of Sp. G. 1.84 is used. This amount (74.623 cc.) of acid of Sp. G. 1.84 is carefully added to carboy by means of a standardized burette with glass stopcock.

Solution is now well agitated by rolling carboy on table and then allowed to stand a few days. Now five 20 cc. portions are drawn off and titrated, with five 20 cc. portions of our standard absolute N-10 acid, against N-10 sodium hydroxide solution using phenolphthalein and and alizarin as indicators. Alizarin is used on account that the most of this solution is used for nitrogen determinations.

We now calculate our results as follows:—

Let a = 20 or the number of cc. of absolute N-10 acid or N-10 alkali,

Let b = cc. solution necessary to neutralize,

Let x=amount of 1.84 sulphuric acid we should have added,

Let y=amount of 1.84 sulphuric acid used,

Then the problem is a simple one in inverse proportion as:

a : b=y : x

now assume that b=20.5 then

20 :20.5=74.623 : x and

$$x = \frac{74.623 \times 20.5}{20} = 76.489 \text{ cc.}$$

the amount of 1.84 sulphuric acid it would have required to bring our entire solution to N-10 acidity.

$x - y = 76.489 - 74.623 = 1.866$cc or the amount of 1.84 sulphuric acid now necessary to add.

Correcting for the 100 cc. of solution withdrawn for testing would cause a correction of 0.013 cc. of 1.84 sulphuric acid and make total amount now necessary to add to equal 1.853 cc. This amount is now run in from burette and process repeated.

Solution is again standardized in a few days and if necessary further corrections are made. However, we find that by careful work a second correction is seldom ever necessary.

We prefer this method over any other because it is faster, more convenient and fully as accurate.

An Investigation of the Defects of the Official Brown-Duvel Moisture Tester and a Proposed Remedy

A. A. Jones and J. Wm. Barker

Our extensive use of the Official Brown-Duvel moisture tester in the cereal industry has shown up certain defects and limitations of the appa-

ratus as a means of milling control and the technical grading and inspection of grain.

Duplicate tests or series of tests on the same grain produce such discordant results that one is often times inclined to resort to the old method of biting the grain as being just as reliable. Occasionally check results can be obtained but more often a difference in result of from two-tenths to more than one per cent is noted with no apparent reason for the variation and as a result it is necessary to repeat the test.

The three chief causes of abnormal and discordant results, in the order of their importance, are destructive distillation of the grain, lack of uniformity in the dimensions of the thermometer bulbs, and error in calibration of the graduated cylinders.

The destructive distillation of the grain seems to be due to local superheaitng of the oil and grain. This is evidenced by a sudden rise or fall of the mercury column of the thermometer, by charring of the grain and by discoloration of the distillate. Local superheating begins about 150 degrees Centigrade and continues to the end point. This is easily demonstrated by jarring the thermometer and later examining the distilled grain for charring.

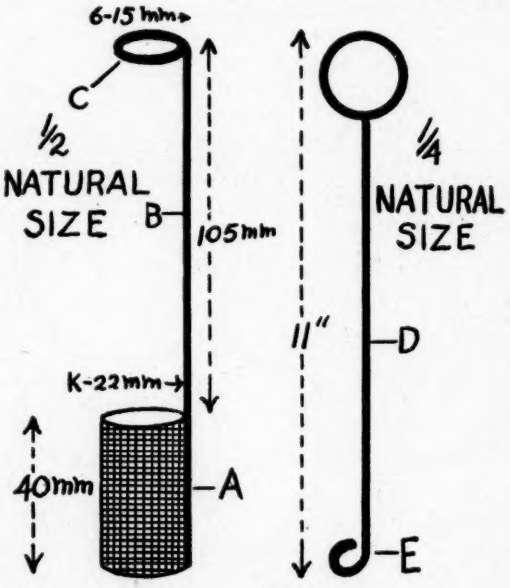
Both vacuum and nitrogen filled thermometers were examined and were found to vary greatly as to length of the mercury bulb. Vacuum thermometers showed the greatest variance, those from the same source varying as much as 6 mm. in length of bulb. The nitrogen filled thermometers manufactured by the Taylor Instrument Co., (Tycos) were very uniform and of the proper length which is a bulb seven-eighths of an inch long and of slender proportions.

Graduated cylinders from three different sources were standardized and found to give readings less than the actual volume. This error was found in some cases to amount to four-tenths of a cc. in 15cc.

In order to make a reliable investigation it was necessary to first select thermometers with the proper length bulb and to re-calibrate our graduates. With the working conditions for each compartment approximating that of all the others we were in position to proceed with an investigation of the causes and prevention of superheating.

DESIGN OF APPARATUS

Believing the reason for superheating to be the inhibiting of free convection currents in the oil and by the grain itself, we designed the apparatus to produce freer circulation of the oil and thus a more uniform distribution of the heat.



Except for minor refinements, the apparatus as originally designed proved successful in preventing local superheating entirely. This apparatus was designed to provide a well with bottom and sides through which the oil could percolate, and then rise

and flow outward in the free oil above the grain. To accomplish this result, a cylinder (A) 40mm. long by 22mm. in diameter was made of No. 18 mill screen wire, a heavy tinned gauze, with a mesh approximately 1mm. square. The lower end is closed with gauze of the same mesh. Rising from the upper edge of the cylinder is a stiff wire handle (B) 105mm in length with a ring (C) 15mm. in diameter turned at right angles at the top. The center of the ring is coincident with the axis of the cylinders.

In use, the sample of grain is placed in the flask and by means of an accessory wire (D) the gauze cylinder is settled in the grain to the bottom of the flask. This places the ring at the upper part of the wire, in the lower part of the neck of the flask. It is thus held securely in an upright position. The oil is then run in and the thermometer placed in position with the stem through the ring (C) at the upper end of the wire and the bulb in the well of oil in the cylinder (A). This cylinder does not cut off the operator's view of the bulb of the thermometer or its adjustment in the oil. The thermometer is adjusted with one-fifth of the bulb exposed and the distillation completed as recommended by the Official Method. The accessory wire is provided with a hook (E) for removing the gauze cylinder before emptying the flask.

All our investigations were conducted on wheat which was thoroughly mixed in a mixing machine and the tests made on an Official Brown-Duvel Moisture Tester.

Table No. 1 is representative of results obtained without our appliance.

TABLE NO. 1.
(Without Appliance)

Nitrogen filled thermometers were used in all flasks.

Flask No.	I	II	III	IV	V	VI
Heat turned off	180°	180°	180°	180°	180°	180°
Highest temperature reached	195°	193°	186°	192.5°	198°	191.5°
Percent Moisture	10.82	10.17	9.66	10.66	10.96	10.47

Physical condition of wheat: Some charring noticed in all-dark brown to black.

Behavior of thermometers:—No. 1 and 2 rose smoothly after turning off the heat. No. 3 rose suddenly to 188, then dropped to 183 when jarred, then rose smoothly to 186. No. 4 rose smoothly. No. 5 rose smoothly to 191, then suddenly to 198, but dropped to 195 when jarred, rose smoothly then to 197.5. No. 6 rose smoothly to 191.5.

Table No. II is the results obtained with the same wheat, the same thermometers and under similar conditions to those obtaining for Table No. I, except that our appliance was used in each flask.

TABLE NO. II.
(With appliance)

Flask No.	I	II	III	IV	V	VI	VII	VIII	IX	X
Heat turned off	180°	180°	180°	180°	180°	180°	180°	180°	180°	180°
Highest temperature reached	186°	187°	186½°	187°	186½°	187°	189½°	189½°	190°	187°
Per cent moisture	9.39	9.45	9.25	9.32	9.32	9.35	9.35	9.32	9.22	9.25

Physical condition of wheat:—No charring. Uniform light brown throughout.

Behavior of thermometers:—After turning off heat, all rose smoothly to the maximum and then fell smoothly. Not affected by jarring.

An experiment was next performed using our appliance with vacuum thermometers to show the quantitative effect of differences in length of the mercury bulb. It was found that for each mm. increase in length of bulb the apparent moisture content was 0.1% lower. When using a thermometer with a bulb one inch long, results were 0.35% lower than the mean. When using a thermometer with a bulb only eleven-sixteenths of an inch long results were 0.34% higher than the mean. As all nitrogen filled thermometers which were available were of uniform length, we were not able to determine what the effect of differences in length of bulb for them.

If an operator inadvertently permits the temperature to rise above the point designated by the directions accompanying the Official tester, the results are usually abnormally high and are always to be discredited. We therefore wished to determine the effect of higher temperature than those designated, when using our appliance. Accordingly a series of determinations were made on wheat, turning off the heat at 180, 185 and 190 respectively. Results are shown in tables III, IV, and V.

TABLE NO. III

(With appliance)

Nitrogen filled thermometers were used in all flasks.

Flask No.	I	II	III
Heat tuurned off	180°	180°	180°
Highest temperature reached	189°	190°	188°
Per cent moisture	9.86	9.94	10.04

Mean per cent moisture 9.94

Maximum deviation from mean 0.1%

TABLE NO. IV

(With appliance)

Nitrogen filled thermometers were used in all flasks.

Flask No.	I	II	III
Heat turned off	185°	185°	185°
Higest temperature reached	194°	195.5°	192.5°
Per cent moisture	10.17	10.25	10.25

Mean moisture 10.23%

Maximum deviation from mean 0.06%

TABLE NO. V

(With appliance)

Nitrogen filled thermometers were used in all flasks.

Flask No.	I	II	III
Heat turned off	190°	190°	190°
Highest temperature reached	198°	197°	1.98.5°
Per cent moisture	10.37	10.45	10.25

Mean moisture 10.36%

Maximum deviation from mean 0.11%

No charring of grain was noticed at any temperature below 200 C. when our appliance was used.

From the data which we have available it appears that when using our appliance a flat reduction of 0.2% from the moisture reading is applicable for each five degrees rise above the official temperature should this happen when making a test.

CONCLUSIONS

1 Superheating of the oil and grain in a Brown-Duvel moisture tester produces unreliable results.

2. Appliance to prevent superheating is described.

3. Dependable check results were obtained with this appliance.

4. Specifications were given for type and length of thermometer bulbs.

5. Need of more careful calibration of graduated cylinders was indicated.

NOTICE

All members who have not sent in their papers which were promised for this Journal please get them in by March 1st, 1922. The Journals will be published in the following months: January, April, July and October. All papers etc. must be in 30 days before date of publication.

ASH DETERMINATIONS

M. E. Schulz
The Weber Flour Mills Corporation, Salina, Kansas

What is the ideal method for determining ash content of flour and feed? Most of us will admit the several objections to the calcium acetate method, chief of which is the tendency of the acetate to vary with age, necessitating running a blank with every determination.

Many will say the official method f the A. A. C. C. cannot be improved on. Most of us burn ash at a dull red heat but may not different ideas as to "dull red" vary considering the actual temperature of the muffle. Some burn ash 4 to 6 hours while others burn over night. In burning a number of crucibles the muffle needs to be heated considerably hotter than "dull red" in order to have the front of muffle hot enough. In this case some are liable to fuse. Would it not be better to have a pyrometer connected with muffle so as to keep a constant temperature in muffle?

Does the size and shape of crucible used have anything to do with the result? Some use the narrow high form porcelain crucible while others use a flat porcelain dish. The writer uses the wide form silica crucible (25 cc. capacity) because more flour is exposed to the surface and it ashes down much better than when a tall narrow crucible is used. The lower grades of flour also ash down better in the same temperature with the patents. With a tall narrow crucible one often must burn the lower grades a little longer and at a higher temperature.

Would like to hear comments from different members through these columns in regard to the above methods.

ABSTRACTS

The following abstracts were taken from the Chemical Abstracts and published in this Journal by permission of the Editor E. J. Crane.

THE EDITOR.

BLEACHED FLOUR IN UNITED STATES OF AMERICA. Anon. *U. S. Dept. Agr., Bur. of Chemistry, Service and Regulatory Announcements,* No. 26, 21; *Analyst* 46, 139(1921).—The Bureau regards as adulterated, flour bleached by any process, if the bleaching has reduced the quality or strength or has concealed damage or inferiority. Bleached flour may, however, be shipped within the jurisdiction of the U. S. A. Food and Drugs Act if it satisfies the above requirements, provided that it is branded to indicate that it has been bleached. No action will be taken at the present time on the ground that bleaching introduces into the flour a substance which may be injurious to health, provided, as a result of bleaching, there is not introduced such a quantity of the bleaching agent as may render the flour injurious as indicated in a decision of the Supreme Court. H. G.

RELATION BETWEEN THE MECHANICAL PROPERTIES OF DOUGH; AND BREAD MAKING. M. Chopin. *Bull. soc. encour ind. nat.* 133, 261-73 (1921).—An app. is described and figured by means of which it is possible to measure the tenacity of a dough in terms of the effort necessary to cause a sample to assume a given shape in a const. time ,and to measure the capacity of dough to stretch into a thin membrane. It is shown that temp., compn. of the dough, method of working the dough, age of the flour,

and length of time the dough is allowed to stand, all have an influence on the results. Measurements with numerous samples of flour show that the difference between the sp. vol. of bread which can be obtained with a flour and the initial sp. vol. of the dough from this flour is proportional to the square root of the coeff. of extension of this dough developed in a thin membrane. Thus it is possible to det. the index of swelling during bread-making and the yield of bread from a given flour. J. S. C. I.

ANALYTICAL INVESTIGATIONS ON A BREAD PREPARED WITH WHEAT DOUGH. O. Mattirolo and G. Issoglio. *Ann. r. accad. agr. Torino* 61, 32-51 (1918) —The wheat was soaked approx. 3 days with 4 changes of H_2O till it showed signs of sprouting, then drained and ground for 10 hrs to a dough from which the bread was baked with the addition of salt and yeast. Analyses are given of the wheat, the waters in which it was soaked, the dough and the bread.

ALBERT R. MERZ.

CHANGES TAKING PLACE IN THE TEMPERING OF WHEAT. E. L. Tague. *J. Agr. Res.* 20, 271-5(1920).—Before grinding wheat, it is the practice to add water to bring the total moisture present up to 15.5% and to allow to stand for 12-48 hrs., with the result that the bran is toughened and more readily sepd. and the flour obtained in higher yield and of better color. The principal factors involved are amt. of water added, time and temp. Three varieties of wheat were tempered with water in a closed bottle in a thermostat for a definite time, and were then ground to flour. Water exts. of the flours were prepd., and detns. were made of the pH concn., the total acidity, the sol. P, and the N titratable by the Sorensen formaldehyde method. Tempering at 5° caused little change in the flour compared with an untempered flour. At 20° chem. changes took place, each of the above detns. giving higher results than with the untempered flour; time also appeared to increase the action and the yield of flour was larger. At 40° the changes were more pronounced, but the milling properties of the wheat had deteriorated, especially after lengthening the time. Increasing the water to 18% produced a sticky flour. The general conclusion is drawn that the improved milling quality of tempered wheat is due chiefly to physical changes. J. S. C. I.

THE COMPOSITION OF CEREAL GRAINS; MISTAKES MADE IN LOCATING THE CHEMICAL CONSTITUENTS OF WHEAT AND RICE GRAINS; ALEURONE. G. Vareschi. *Ann. accad. agr. Torino* 61, 3-31(1918); *Bull. Agr. Intelligence* 11, 176.—The distinction between aleurone and the proteins in the starchy portions of the grain is pointed out. Rice contains glutenin, gluten-casein, gluten-fibrin and edestin, but not gliadin which is typical of true gluten. Wheat and rye contain conglutin, glutenin and gliadin. To avoid confusion the term aleurone should be abolished.

T. G. PHILLIPS.

VITAMINES AND YEAST GROWTH. Roger J. Williams. Univ. Oregon. *J. Biol. Chem.* 46, 113-8(1921).—A comparison has been made of the vitamine content of different foodstuffs, as detd. by the yeast method (*C. A.* 14, 2350) by the use of growing rats. "The quant. yeast method for detg. vitamine in the materials selected by Osborne and Mendel gives results fairly concordant with the results obtained by Osborne and Mendel in rat feeding expts. Bakers' yeast, however, by the yeast method shows a much higher vitamine content than brewers' yeast, whereas by animal feeding expts. brewers' yeast is found

much richer. A bakers' yeast ext. is found to be richer as regards the growth of bakers' yeast than a brewers' yeast ext. A brewers' yeast ext., growth of brewers' yeast than a bakers' yeast ext. This is interpreted to mean that there is some specificity in growth stimulants, but not necessarily two totally different substances stimulating the growth of two varieties of yeast." Some evidence was obtained of the possibility that vitamine C, as a secondary factor, may stimulate yeast growth.

A. P. LOTHROP.

THE NUTRITIVE VALUE OF YEAST IN BREAD. P. B. Hawk, C. A. Smith and O. Bergeim. Jefferson Med. College. *Am. J. Physiol*, 56, 33-9 (1921).—"Standard" bread contg. about 10% of the total protein in the form of milk proteins was inadequate for the support of normal growth in white rate. The addition of 5% of yeast powder gave a much more efficient fation. The value of yeast as a constituent of food products is emphasized.

J. F. LYMAN.

STUDIES IN FERMENTATION. V. ENZYME FORMATION THROUGH THE ACTION OF IONS. W. Biedermann. *Fermentforschung* 4, 1-28(1920); cf. *C. A.* 14, 1345.—I. AMYLOSE, AMYLOPECTIN, AND AMYLOCELLULOSE. A clear amylose soln. can be obtained by extg. wheaten starch with water at 80°. The extd. residue B. considers to be "amyloptectin." An amylose soln. could not be obtained at the ordinary temp. from potato starch. The extd. residues from wheaten and pea starch, on being digested with filtered saliva, left a residue, which did not give the I reaction and behaved like cellulose. Potato does not contain this substance. II. The influence of salts on the autolytic cleavage of pure amylose. From the results B. obtained by studying the action of various salts on sol. amylose, he concludes that the sol. amylose forms a complex with certain ions which acts as an autolytic enzyme. Amylopectin is resistant to the action of saliva in the presence of those salts, and can therefore be sepd. from it in this way. It also is evident that the autolytic enzyme formed is not identical with the saliva enzyme (ptyalin?).

J. C. S.

THE RELATION OF PROTEIN CONTENT TO VARIETY TYPES IN AMERICAN WHEAT. H. F. Roberts. *J. Agr. Sci.* 10, 121-34(1920).—From a critical review of the American literature on this subject R. draws the following conclusions: No wheat variety possesses all of the desirable characteristics. In the case of winter wheat a high protein content is favored by a short, comparatively dry growing season, especially in the spring. The most important factor in detg. the starch-protein ratio is water supply. Regional types of wheat range from 9.16% protein to 13.89% protein. While with respect to regions of the country variation in protein content ranges from 11.35% in the Atlantic and Gulf States to 12.74% in the Western States, and 9.73% in the Pacific Coast States. Wheats which were grown in Maine and contained 12.2% protein showed 14.52% when raised in Minnesota. Differences in protein content due to variety were as follows: bread wheats 13.44 to 13.68%; Russian durums 14.2 to 15.19%; and Mediterranean durums 14.51 to 16.14%. Within the bread wheats varietal differences were noted. "The variation in protein content is measured by the error of mean square, or 'standard deviation.' It appears that, computing the data from California and Utah, the wheat varieties most widely grown in those States are the ones that turn out, according to the writer's computation, to have the widest variability in respect to their protein content.

i. e., which have the highest standard deviation." R. B. DEEMER.

FLOUR MILLING AND THE CEREAL CHEMIST. R. Wallace Mitchell. *Chem. Age* (N. Y.) 29, 85-9(1921).—Characteristics of wheat and the duties of the cereal chemist are discussed. E. H.

WHEAT FLOUR. I. ELECTRIC CONDUCTIVITY OF WATER EXTRACTS. C. H. Bailey and F. A. Collatz. *J. Ind. Eng. Chem.* 13, 319-21(1921).—See *C. A.* 14, 3729. E. H.

FLOURS AS FOODSTUFFS AND THE QUESTION OF VITAMINES. Em. Perrot and R. Lecoq. *Bull. sci. pharmacol.* 28, 177-91(1921).—A report of the growth of white rate when fed on diets consisting of various brands of com. flours, compared with controls on diets of adequate biol. value. The results indicate that such food materials are deficient in substances compatible with continued health and life. F. S. HAMMETT.

A LABORATORY METHOD FOR THE PREPARATION OF FIBRINOGEN. Jay McLean. John Hopkins Univ. *Bull. Johns Hopkins Hosp.* 31, 453(1920).—A readily sol. pptd. fibrinogen is obtained by salting out fibrinogen with $(NH_4)_2SO_4$ instead of NaCl. It will dissolve after 3 repptns. and it is thus possible to obtain a product freer from prothrombin, which tends to adhere to the ppt. The method is as follows: Carefully pour or pipet off the clear plasma from cat or dog blood, oxalated and centrifuged for 20 min. Add ¼ its vol. of satd. $(NH_4)_2SO_4$ soln. and promptly centrifuge for 5 min. Pour off the supernatant fluid. Carefully wash the ppt. at least twice by layering over it $^1/_5$ satd. soln. of $(NH_4)_2SO_4$. Add to the washed ppt. a vol. of 2% NaCl soln. equal to that of the original plasma and stir gently until dissolved. Filter. Ppt. and centrifuge as before. Pour off the supernatant liquid and drain. Wash for some min. in $^1/_5$ satd. $(NH_4)_2SO_4$ soln. and drain. Wipe the inside of the centrifuge tube with filter paper. Dissolve in 1% NaCl soln. and filter. Usually 2 pptns. are sufficient but the process may be repeated a third time. The soln. should clot in a few min. on adding thrombin or prothrombin and Ca should not clot either spontaneously or on the addition of $CaCl_2$. Fibrinogen prepd. by using NaCl has time and again failed to go into soln., whereas fibrinogen prepd. from the same plasma, but pptd. with $(NH_4)_2SO_4$, dissolved rapidly.

A. P. LOTHROP.

THE IDENTIFICATION FROM THE CHEMICO-LEGAL VIEW POINT OF A FLOUR WHICH HAS BEEN SUBJECTED TO THE EFFECTS OF BAKING. Alex Ionescu. *Bull. soc. chim. Romania*, 2, 9-11(1919).—Wheat flour contains 4 elements which might be considered in identifying the bread made from it, *viz.*, proteins, carbohydrates, mineral matter and cellulose. The proteins and carbohydrates are so greatly altered in baking they are of little value in connecting a particular sample of bread with a specific flour. The amt. of mineral salts is so small and may be so greatly affected by the water and NaCl added to the dough that they cannot be considered in legal evidence. Cellulose, however, is so characteristic of the quality of a flour and so slightly altered in baking that its detn. and microscopic appearance may be used as abs. proof of the identity of a flour and a sample of bread. H. S. BAILEY.

CORRECTION AND SUPPLEMENT TO OUR STUDY "THE CHEMISTRY OF THE POLYSACCHARIDES." E. Herzfeld and R. Klinger. *Biochem. Z.* 112, 55-60 (1920).—Referring to the earlier report (*C. A.* 15, 99) the authors here

state that maltose is detectable in significant amts. when starch or dextrin is digested with a diastase prepn., thus retracting the former finding that no sugar is produced under these conditions. Results are presented which indicate that the splitting of some 80% or more of the starch into sugar is the exception, not the rule, since the alc.-sol. sugar is but 10 to 20% of the amt. of starch originally used. When sol. starch, potato starch and glycogen are treated with diastase, it appears as if the amt. of enzyme added is the significant factor and not the type of polysaccharide employed. The conception of the action of diastase on polysaccharides is extended into the idea that not only does this enzyme act as a simple sol. agent in that it changes the substrate into a higher degree of dispersion, but also the acknowledgment is made that the enzyme acts as a hydrolytic splitting agent. The former process is a property of many other chem. compds such as formalin. The hydrolytic active oenstituents are complex and very labile and are those on which the *fermenting* function of the mater ial depends. F. S. HAMMETT.

THE LEAVENING OF BREAD AND BAKED GOODS. J. Grossfeld. *Chem.-Ztg.* 44, 889-90(1920).—A discussion of the value of yeast and baking powders in raising dough. The taste of the baked product is not influenced as much by the yeast as by the decompn. products produced during the fermentation. The use of mineral and org. acids with $NaHCO_3$ for leavening is considered. Phosphoric acid was found to act satisfactorily. Whey, buttermilk or other sour milk products with $NaHCO_3$ and $CaCO^3$ are recommended in baking.

H. A. LEPPER.

THE ACID CHARACTER OF FLOUR. Joh. Pinnow. Bremen. *Z. Nahr. Genussm.* 40, 243-6(1920).— Twenty g. of sugar, 50 cc. of water and 2 cc. of N Na_2CO_3 were steam-distd. into 0.1 *N* $Ba(OH)_2$. 72.2% of the total CO_2 present passed over in 40 min. Without sugar, other conditions being the same, 20.8% of the CO_2 passed over. A somewhat parallel expt. was carried on with rye flour with similar results. D. B. DILL.

THE ACTION OF HYDROGEN PEROXIDE ON FLOUR. Lindet. *Compt. rend. agr. France* 6, 843(1920).—Wheat grains contain a sol. ferment which decomposes H_2O^2. The catalase is found mostly in the peripheral parts of the grain. White flour is poor in catalase. Based on these observations a process has been developed in which the purity of the flour may be ascertained as well as the fineness of the milling. Details of the process are not described. F. M. SCHERTZ.

SUGGESTED MODIFICATION OF THE METHOD FOR CRUDE FIBRE. L. D. Haigh. Univ. of Missouri. *J. Assoc. Official Agr. Chem.* 4, 336-9(1921).—It is suggested that feeds high in protein content, such as linseed and cottonseed meal, be digested at 40° for 30 min. in presence of dil. HCl and filtered on asbestos before the H_2SO_4 treatment of the official crude fiber method. No colloidal solns. are then encountered in the filtration to cause difficulty. Collaborative results did not warrant recommendation for adoption of the modification but further study is proposed.

H. A. LEPPER.

THE PROTEINS AND COLLOID CHEMISTRY. Jacques Loeb. *Science* 52, 449-56(1920).—An address. (1) A number of authors have tried to explain the behavior of proteins from the viewpoint of the newer concepts of colloid chemistry, *i. e.*, that these substances do not act by chem. forces of valence, but follow the rules of adsorption. Those who have advocated

the purely chem. view of these phenomena have not been able to show that ions combine with protein in the typical ratio in which the same ions combine with crystalloids. This proof only becomes possible when it is recognized that the pH of the protein soln. dets. the amt. of ion combined with the protein, and the true comparison of one ion with another can only be made at the same pH. The Hofmeister series of ions and Pauli's series of acids present anomolies for this reason. Such series have no real existence owing to the fact that the pH of the solns. was not measured. (2) Only the cation or the anion, or neither, can combine with protein. Which of these 3 conditions is attained depends on the pH of the soln. Gelatin, for example, at pH= 4.7 (isoelec. pt.) combines with neither ion. at pH> 4.7 only with cations (Na gelatinate); at pH <4.7, only with anions (gelatin chloride). This can be clearly shown when powdered gelatin, brought to various pH values, is treated on a filter with a neutral salt soln. and the excess of salt washed away. The expts. are most striking when salts one of whose ions give decided qual. tests are used, *e. g.*, $AgNO_3$, $NiCl_2$, $K_4Fe(CN)_6$, $NaCNS$, etc. It follows that concn. does not define a protein soln.—pH must also be stated. The exptl. work described below was done with isoelec. gelatin, given the desired pH by addition of acid or alkali. (3) When acid is added to isoelec. gelatin (or other protein), equil. is established between acid, gelatin-acid salt, isoelec. gelatin; when alkali is added equil. is established between metal gelatinate, isoelec, protein, hydrogen ions. (4) The chem. nature of this union is shown by the fact that 3 times as many cc. of 0.1 *N* H_3PO_4 are required to bring 100 cc. 1% gelatin soln. to a given pH as required in the case of HCl or HNO_3, twice the no. of cc. of 0.1 *N* oxalic and the same number of cc. of 0.1 *N* H_2SO_4 (as both the H atoms in H_2SO_4 are fairly strongly dissociated). Analogous results are shown with bases, and with both bases and acids in the case of cryst. egg albumin. (5) The most important fact is that from these combining ratios, the phys. properties of proteins can be predicted. It is found that any acid whose anion combines as a monovalent ion (Cl-, H_2SO_4-) raises the osmotic pressure, viscosity and swelling of protein approx. twice as much as one whose ion combines as bivalent ion, (SO_4--). The same rule holds for cations. Curves are shown in which pH is plotted against magnitude of certain phys. properties (*e. g.* swelling) and almost identical effects are seen with chloride, bromide, nitrate, tartrate, succinate, citrate, phosphate, with minimum at pH= 4.7 ,and max. at about pH=3.2; gelatin sulfate gives parallel curve, but max. value only half that obtained above. These facts are contradictory to the Pauli or Hofmeister series, owing to the fact that pH was not measured in the solns. studied by P. and H. As would be expected more of a weak acid is needed to bring a given gelatin soln. to a given pH than of a strong acid, but when this pH is reached the gelatin is in each case in combination with the same amt. of acid, and the 2 solns. show the same osmotic pressure. Protein salts with ions of the same valence show at the same pH like phys. properties. "The behavior of the proteins, therefore, contradicts the idea that the chemistry of colloids differs from the chemistry of crystalloids."

H. W. BANKS, 3RD.

INDUSTRIAL CLASSIFICATION OF STARCHES AND FLOURS. THEIR COMMERCIAL DESIGNATIONS. Arpin. *Ann. chim. anal. chim.*)*appl.* 3, 74-84 (1921).—Gives moisture, ash, nitrogenous matter and microscopical description of *flours, amidons* (=

starches from cereals and grains) and *feculas* (=starches from roots, rhizoms, trunks, etc.). Data include the following, *flours*—wheat, corn, rice, tapioca; *amidons*—wheat, corn (pearl and powder), rice, sorphum; *feculas*—tapioca (including flake and pearl) potato and sweet potato (Japanese), arrow root, sago.

JEROME ALEXANDER.

GLUTEN AND WATER-SOLUBLE PROTEIN IN 65% WHEAT FLOURS OF THE HARVEST OF 1919. M. P. Neumann and E. Meyer. *Z. ges. Getreidew* 13, 11-4(1921).—Analyses of 10 samples of grain and corresponding flour for H_2O, ash, protein, H_2O-sol. protein, and gluten are given. The av. protein was 12.45% in grain and 11.34% in 65% flour, 12.4% of the former and 16.9 of the latter being sol. in H_2O, showing 90% of the sol. protein of the grain in the flour. The av. gluten in the flours was 9.6%, the gluten N being 85% of the total N.

H. A. LEPPER.

CONTROL OF ROPE IN BREAD. C. B. Morison and F. A. Collatz. Am. Inst. Baking, *Bull.* 5, 18pp.(1921).—The characteristics are given of the cultures obtained from a rope-infected flour, used in the baking expts. The influence is reported of addition of AcOH, lactic acid, HCl, H_2SO_4, $NaHSO_4$ alone and with KH_2PO_4 on the quality, pH, and development of rope in bread made from 3 grades of flour. The difficulty of producing bread of good quality and of pH necessary to inhibit rope by addition of acid and acid salts to several grades of flour is shown. Inoculated doughs from patent and blend flours respond more readily to treatment than the clear. Various combinations of $NaHSO_4$ and KH_2PO_4 inhibit rope in the former flours; $NaHSO_4$ alone does not produce bread of good quality. The inhibition of development of rope-producing organisms in bread at pH higher than 5.0 is indicated in these expts. A note on the use of methyl red to det. acidity in bread and a bibliography of 30 references are given.

H. A. LEPPER.

CALCIUM PEROXIDE IN BREAD MAKING. C. J. Patterson and R. W. Mitchell. U. S. 1,370,354, Mar. 1. CaO_2 up to about 0.007% the wt. of the flour is incorporated in bread dough to increase its capacity for moisture.

DETERMINATION OF MOISTURE IN CEREALS, ETC. Soc Anon des Grands Moulins Vilgrain and M. Chopin. Brit. 155,486, Feb. 25, 1920. Addition to 143,191. In app. of the kind described in the principal patent, the heating chamber through which the grain, etc., is passed is surrounded by a cast-iron cylinder, which tends to preserve uniformity of temp., even when the current through the heating coil varies. A suitable app. is specified.

ALKALINITY AND PHOSPHATE DETERMINATION IN THE ASH OF FOODS. J. Tillmans and Anna Bohrmann. Frankfurt a. M. *Z. Nahr. Genussm.* 41, 1-17(1921).—A modified method for the detn. of alkalinity is proposed. The finely ground ash is treated with 50, or if necessary 100 cc., of 0.1 *N* HCl. After it has stood 15 min. in the cold, a spoonful of pure, powdered NaCl is added and the mixt. shaken vigorously. Agitation of the liquid with a small rubber bellows aids in removing CO_2. Thirty cc. of 40% $CaCl_2$ soln. and 0.2 cc. of 1% phenolphthalein are now added and at 14° the surplus acid is titrated with 0.1 *N* NaOH. It is advisable to allow the liquid to stand in a closed flask for 2 hours before completing the titration. The difference between acid and alkali gives the alkalinity due to oxides and carbonates. Reference to the original must be made for

details of the ortho-, pyro- and metaphosphate detns. The methods described were more successfully applied to artificial mixts. than former methods. *Milk ash* contained a slight alkalinity and 30-40% phosphates (ortho-); *flour ash* contained no characteristic alkalinity and a mixt. of phosphates; *ash of beef* and *horse flesh* contained no carbonates or oxides but a mixt. of 6-7% ortho- and 47-50% pyrophosphates; the alkalinity of the *fruit juice ash* examd. was due chiefly to carbonates and all the phosphate ion present (15-20%) was in the ortho- condition. The alkalinity of *cocoa ash* was due to a mixt. of oxides and carbonates. 33% of orthophosphate was present.

D. B. DILL.

IODOMETIC DETERMINATION OF THE DIASTATIC POWER OF MALTS. Julian L. Baker and Henry F. E. Hulton. *Analyst* 46, 90-3(1921).—The method of A. R. Ling (*C. A.* 5, 562) for detg. the diastatic value of malts, which depends on the CuO-reducing power exhibited when they act on sol. starch, presents some difficulties to those unaccustomed to use it. Since maltose is oxidized quant. to maltobionic acid by I in the presence of NaOH, the diastatic capacity of malt exts. may be detd. iodometrically. One cc. of 0.1 *N* I, equals 0.017 g. of maltose. The following method is proposed: As in Ling's method, allow 1, 2 or 3 cc. of ext. to act 1 hr at 21° on 100 cc. of 2% sol. starch. Stop the action by adding 10 cc. of 0.1 *N* NaOH and dil. to 200 cc. For the titration take 50 cc. of this soln., add 20 cc. of 0.1 *N* I soln. and 30 cc. of 0.1 *N* NaOH. Allow to stand 10 min. at air temp., acidify with 4 cc. of 0.1 *N* H_2SO_4 and titrate excess I with 0.05 *N* $Na_2S_2O_3$. The diastatic capacityD. P. $=6.7\ Y/X$ where Y=cc.of 0.1 *N* 1 used in oxidizing the maltose, and X=cc. of 5% malt ext. originally taken for conversion. The reducing power $R = 3.4\ Y$; and it is evident if $Y > 10$, $R > 34$. A table is given showing R, and percentage fall in D. P. which indicates the importance of keeping below the limit $R = 34$ because of the rapid fall in the D. P. near this point. Comparison of the D. P. of various malts as detd. by the Ling and by the proposed method indicate satisfactory agreement; a table is given. It is claimed for the method that it is more accurate than Ling's, as no external indicator is needed, and also that it can be carried out by artificial light.

H. S. BAILEY.

BLEACHING AND CONDITIONING FLOUR AND MEAL. J. C. Baker. Brit. 159,166, Dec. 13, 1920. Flour and other cereal products are bleached and matured by treatment with NCl_3 which is applied in the form of vapor mixed with air or other inert gas. Cl as a gas or in soln. is passed into liquid or mixed with a soln. of an NH_4 salt, and air is passed through the liquid to carry off the NCl_3. The NH_4Cl may be treated with bleaching powder or NH_3 mixed with air or CO_2 may be passed over bleaching powder. Alternatively a soln. of Cl may be neutralized with limestone and mixed continuously with $(NH_4)_2SO_4$ soln. The liquid may be sprayed or aerated to vaporize the NCl_3. Cf. *C. A.* 15, 1047.

THE CONTROL OF LUBRICATING OILS. R. Dubrisay. *Ann. fals.* 13, 25-33 (1920).—The complexities in the physics of lubrication are pointed out. It is essential that the oil be non-corrosive, not easily saponified by heat, possess a high point of inflammability, and be non-resinifying. The most serviceable means of differentiating between oils for certain mechanical friction is by viscosity. The several types of *viscosimeters* are discussed and D. described his design of viscosimeter for oils. It is essentially

two bulbs of 2 cc. capacity each and connected by a tube so that the whole forms a pipet. It is useful in the smaller oil stations, whereas the other viscosimeters are meant to be used by skilled operators with lab. control.

H. F. ZOLLER.

CONTRIVANCE TO PREVENT WATER SUCKING BACK FROM WATER VACUUM PUMPS. Hans Dorsch. Chem. Inst. Wurzburg. *Chem. Ztg.* 45, 32(1921) 2 cuts.—The grip of a stout Geissler stopcock is fastened in a cork with sealing wax and the cork held in a clamp so that the hole through the body of the cork is nearly horizontal, the small end of the body pointing slightly upward. The tube on 1 side of the cock is about 14 sm. long and is bent downward at about 45° near the end., the other arm being straight and about 9 sm. long. On the long end is a 2-hole stopper carrying a 250-300 cc. flask. Through the other hole a tube enters and bends downward to the lower side of the flask, the outer end being connected to the pump with a short piece of flexible vacuum hose. The short arm of the cock is connected with the dessicator by a flexible hose and carries a counter-wt. for the flask, which must be well adjusted, and the cock well greased. If the H_2O pressure drops, H_2O sucks back into the flask; this sinks and closes the cock. When the pressure rises again the H_2O is sucked out of the flask and the counter-wt. opens the cock.

J. H. MOORE.

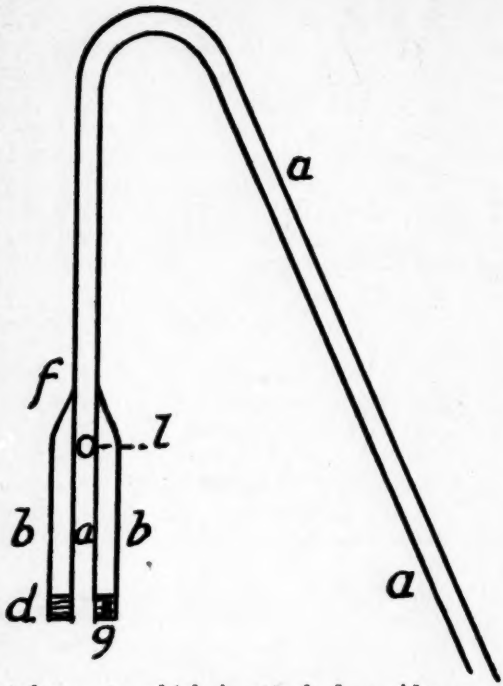
CONTRIBUTIONS FROM LABORATORY PRACTICE. O. Rudolph Spandau. *Chem. Ztg.* 45, 288-9(1921); cuts.—(1) *Concentration of solution by evaporation.*—This is hastened by bubbling dry air from a H_2O pump, or other source, through the boiling soln. (2) *Rapid drying apparatus for substances sensitive to high temperatures.*—The substance is placed on the shelf of a desiccator, preferably with 2 side tubulures, and the desiccator placed in a H_2O bath. $CaCl_2$ tubes with regulating cock are connected to 1 end of a coiled Pb pipe in the bath, the other end of the pipe being connected through a stopper in 1 tubulure to a short piece of rubber tubing which delivers the warm, dry air at the bottom of the desiccator. The other tubulure is connected to a manometer and suction filter flask with bits of pumice satd. with H_2SO_4 in the bottom, and a $CaCl_2$ tube between the flask and H_2O pump to catch moisture that escapes the H_2SO_4. The bath is heated to the desired temp., the desiccator exhausted till the pressure is about 10 mm. above the vapor tension of the H_2O (or alc.) at that temp., and the cock on the $CaCl_2$ tubes set so that a slow current of air is drawn through the app. (3) *Easily constructed Bunsen burner made of glass tubing.*—The sides of a suitable tube are thickened with a pointed flame until the inside diam. is reduced to about 0.75 mm., for the gas passage. Just above this point a hole is blown equal in diam. to the inside diam. of the tube, for the air inlet.

J. H. MOORE.

SIMPLE MEANS OF HOLDING THE WATER CONSTANT IN WATER BATHS. Hans Haller. Munich. *Chem. Ztg.* 45, 221(1921).—A T-tube is inserted in a stopper near the bottom of the bath, the stem of the T pointing upward. The other arm of the T is attached to the H_2O supply, the top of the stem being connected with a drain to take the excess H_2O. The height of H_2O in the bath is regulated by the angle at which the stem rises.

J. H. MOORE.

AN AUTOMATIC SIPHON. C. J. Pelle. *Chem. Weekblad* 18, 127(1921).—An automatic siphon devised by P. H. Bon consists of an ordinary siphon



tube, *a*, to which is attached a wider tube *b*. Tube *a*, is provided with an opening into *b* at *l*. Tube *b*, is closed with a cork *d*, through which *a* passes. This cork is perforated with a small hole *g*. The siphon being immersed, liquid enters into *a* much more rapidly than it does into *b* and reaching a point above *l*, the air in *b* is placed under pressure, forcing out the liquid above it, thus starting the siphon. N. VAN PATTEN.

The following Abstracts taken from Experiment Station Record.
The Editor.

THE SIGNIFICANCE OF DEFECATION IN CONNECTION WITH THE ABSORPTION OF THE NITROGEN OF BREAD MADE WITH UNBOLTED FLOUR. E. C. Van Leersum (*Extract from Arch. Neerland. Physiol. Homme et Anim., Ser. 3C, 3* (1919), *No. 2, p. 199*).—This work, like earlier experiments by the author, was undertaken to test the proportion of the total nitrogen of the wheat that is utilized by the body when coarse whole wheat bread is consumed in large quantities.

According to the author's previous work, the percentage of nitrogen absorbed varies with the dryness of the feces and becomes greater as the length of time before defecation is increased. In the present experiments, normal subjects were placed upon a diet containing a proportion of bran corresponding to that used in experiments reported by Hindhede. After a preliminary control period a condition of defecation similar to that usual with the subject of Hindhede's experiments was artificially induced by the administration of small doses of opium, and the same diet was continued through three more experimental periods. The stools for the different periods were compared and the nitrogen absorption for each was calculated, the results showing a noticeable increase in nitrogen absorption during the periods when the opium produced conditions of retarded digestion resembling those in the Danish experiments.

A careful study was also made of the nitrogen occurring in different parts of the grain and the comparative availability of that in the endosperm, the germ, the aleurone layer, and the outer coatings. From this it is concluded that the increase in nitrogen absorption which accompanied the retention of the feces was due more to the nitrogen from the endosperm than to the less available nitrogen from the outer portions of the grain, and this is considered further argument against the economy of bran as a source of nitrogen to the human body. In general, the author's experiments are held to indicate that or persons of normal habits of defecation—that is, for the great major-

ity of persons—the consumption of unbolted flour entails a greater loss of nitrogen.

WHEAT AND THE FLOUR MILL—A HANDBOOK FOR PRACTICAL FLOUR MILLERS. E. Bradfield *(Liverpool: North Pub. Co., Ltd., 1920, pp.* [4]+XI+ 163, pl. 1, fig. 1.).—This volume consists of a foreword by R. C. Winter; a collection of papers by the author on the theory and practice of modern flour milling; papers on the bleaching of flour, from a chemist's point of view, by W. Jago, and from a baker's point of view, by J. Kirkland; and a paper on chemistry and physics as applied to milling, by F. E. Treharne.

WATER-SOLUBLE VITAMINES, I, II *(Jour. Biol. Chem., 43 (1920),* No. 1, pp. 265-294, pls. 3, figs. 6).—Two papers are presented.

I. *Are the antineuritic and growth-promoting water-soluble B vitamines the same?* A. D. Emmett and G. O. Luros (pp. 265-286).—In this paper evidence is presented which is thought to indicate that the antineuritic vitamin and the growth-producing water-soluble vitamin are not identical. The evidence consists of a tabulated summary of the literature dealing with the stability of the water-soluble vitamin toward heat and reports of experimental work in which the same source of water-soluble vitamin was used for studies on poly-neuritis in pigeons and on the rate of growth in young rats. The data from the literature are grouped in two tables, one dealing with the temperature of destruction of the vitamin as determined by curative and prophylactic tests with fowls, and the other with the growth of young rats. A comparison of these tables shows that both the antineuritic and growth-producing vitamins were fairly stable at temperatures around 100 to 105°C. but that at higher temperatures the antineuritic vitamin appeared to be less stable to heat and to alkali than the rat growth-promoting vitamin.

In the experimental work reported the basal food employed was unmilled rice, which furnished the only source of the water-soluble antineuritic and growth-promoting vitamins. The rice was heated under different conditions and at different temperatures and was fed unground to pigeons as their sole food, and ground to rats, the rice in the latter case being so supplemented with lactalbumin, butter fat, and lard as to form a balanced ration for growth, provided no destruction of the vitamin by heat had taken place. The rice for the various experiments was heated in the air oven at 120° for 2 hours, and in the autoclave at 120° and 15 lbs. pressure for 1, 2 and 6 hours, respectively. The food intake for the rats was determined directly and for the pigeons by calculating the total consumption of rice for the entire group. In the work with pigeons the experiments also included feeding trials with unheated milled rice plus small quantities of extracts of an olyzed yeast heated in the same way as the unmilled rices, and curative trials with extracts of the vitamin before and after heating.

The results obtained in all the pigeon cases indicated that the antineuritic vitamin was partially altered by heating in the air oven at 120° for 2 hours, and totally destroyed by heating for 2 and 6 hours in the autoclave.

In the rat experiments four groups were so fed that a comparison of the rate of growth of each would indicate the relative degree of destruction of the vitamin through heating the rice. The diets consisted of rice 64, lactalbumin 6, butter fat 18, lard 10, and salt mixture 2 per cent in the first period, and the same constituents in the proportions of 89.7, 3.3, 5, and 2

per cent, respectively, in the second period. Control groups were fed unheated, unmilled rice. The increase in the amount of rice fed in the second period was intended to cover the question of partial destruction of the vitamin by heat, but as the 64 per cent ration apparently contained more than the minimum requirement of the vitamin it could not be definitely ascertained whether the vitamin was slightly destroyed. The average results for each group indicated, however, that heating for 2 hours at 120°, either in the oven or autoclave, had but very slight if any effect upon the vitamin. A slight detrimental effect was observed as the result of heating the rice for 6 hours in the autoclave. That the destruction under these conditions was only slight was also shown by the fact that rats made rapid growth when 1 cc. of an extract of brewers' yeast, heated in the autoclave for 6 hours at 120°, was added to a diet lacking the growth-promoting vitamin and which had caused definite signs of retardation of growth.

"These findings suggest tentatively, at least, that the antineuritic (pigeons) and the water-soluble B (rats) vitamins are not the same, and that it would be better to consider them as being different until there is further proof to the contrary.

A list of 31 references to the literature is appended.

II. *The relation of the antineuritic and water-soluble B vitamins to the yeast growth-promoting stimulus,* A. D. Emmett and M. Stockholm (pp. 287-294).—In the experimental work reported in this paper comparative trials were made to determine whether or not the extracts that caused increased growth of yeast as determined by the Williams' micro method (E. S. R., 41, p. 670) would cure polyneuritis in pigeons or promote growth in young rats. Samples of unmilled rice were heated 1 hour in the autoclave at 120° and 15 lbs. pressure, 2 hours in the autoclave at 120°, and 6 hours in the autoclave at 120° and 15 lbs. pressure. These samples and a sample of unheated rice were each finely ground and extracted with hot 95 per cent alcohol, and the extracts were concentrated in vacuo, taken up with hot water and salt, filtered, and made up to definite volume.

The varying degrees of heating employed were found to have no effect upon the factor which stimulates growth in yeast, although curative tests on pigeons with equivalent amounts of the same extract, as measured in terms of number of cell units per gram of body weight, showed that the antineuritic vitamin was destroyed by heat. This is thought to indicate that the yeast growth-promoting and antineuritic vitamins are not identical.

The evidence regarding the identity of the rat growth-promoting and yeast growth-promoting vitamins, while not so clear, is thought to indicate that the yeast cell stimulus is not in itself able to retard the loss in weight and promote growth in rats, and consequently is probably not identical with the growth-promoting (water-soluble B) vitamin.

"Whether pigeons or rats require this yeast growth-promoting factor for normal development has not, as yet, been definitely proved. Since the amount of yeast growth stimulus, expressed in terms of yeast cell units per gram of substance, does not appear necessarily to vary directly (in terms of potency) with the antineuritic and water-soluble B vitamins, this yeast method should not be employed quantitatively with too much definiteness until further study is made."

An index, complete, from Vol I, No. 1, to and including Vol. VI, No. 4, both author and subject, will be published and distributed in the near future.

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